

## CLAIMS

What is claimed is:

1. An active surface plasmon resonance (SPR) chip, comprising:
  - 5        a first layer of metal;
  - an outmost layer of metal; and
  - a nanometer multilayer structure having a high refractive index of material and a low refractive index of material to form at least a monolayer structure interposed between said first layer of material and
  - 10      said outmost layer of material such that resonant angle and wavelength occurs through an arrangement of said nanometer multilayer structure.
2. An active SPR chip as recited in claim 1, wherein said first layer of material and said outmost layer of metal can be a same material, thereby  
15      presenting a symmetry structure.
3. An active SPR chip as recited in claim 1, wherein said first layer of material and said outmost layer of metal can be a different material, thereby presenting an asymmetry structure.  
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4. An active SPR chip as recited in claim 1, wherein said active SPR chip adopts Sputter as a first method for developing thin film deposition.
5. An active SPR chip as recited in claim 1, wherein said active SPR chip  
25      adopts CVD as a second method for developing said thin film deposition.

6. An active SPR chip as recited in claim 1, wherein said active SPR chip adopts MBE as a third method for developing said thin film deposition.

7. An active SPR chip as recited in claim 1, wherein said active SPR chip  
5 adopts a partial method of VCSEL for developing.

8. An active SPR chip as recited in claim 1, wherein said active SPR chip adopts MicroElectroMechanical process technique as a method for fabrication.

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9. An active SPR chip as recited in claim 1, wherein each layer in a plurality of layers of said nanometer multilayer structure has a thickness of 10 up to 1,000 nanometers.

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10. An active SPR chip as recited in claim 1, wherein said nanometer multilayer structure is composed of a plurality of pairs of materials, said pair being formed by said high refractive index of material and said low refractive index of material, and number of said pairs can be from 1 up to tens.

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11. An active SPR chip as recited in claim 1, wherein a total of a plurality of said layers in said nanometer multilayer structure has a thickness no more than 900 nanometers.

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12. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is Zinc

Sulfide.

13. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is Magnesium

5 Fluoride.

14. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is GaN.

10 15. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is ITO.

16. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is ZnTe.

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17. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is BeZnTe.

20 18. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is MgSe/BeZnTe.

19. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is InGaAs.

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20. An active SPR chip as recited in claim 1, wherein said high refractive

index of material and said low refractive index of material is InP.

21. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is GaAs.

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22. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is  $\text{Al}_x\text{Ga}_{1-x}\text{As}$ .

23. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is GaAsSb.

10 24. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material is  $\text{Al}_x\text{Ga}_{1-x}\text{N}$ .

15 25. An active SPR chip as recited in claim 1, wherein said high refractive index of material and said low refractive index of material forms different metallic- dielectric boundary.

20 26. An active SPR chip as recited in claim 1, wherein said first layer of material couples to crystal or glass substrate.

27. An active SPR chip as recited in claim 1, wherein said first layer of material is coated with binding biomolecules.

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